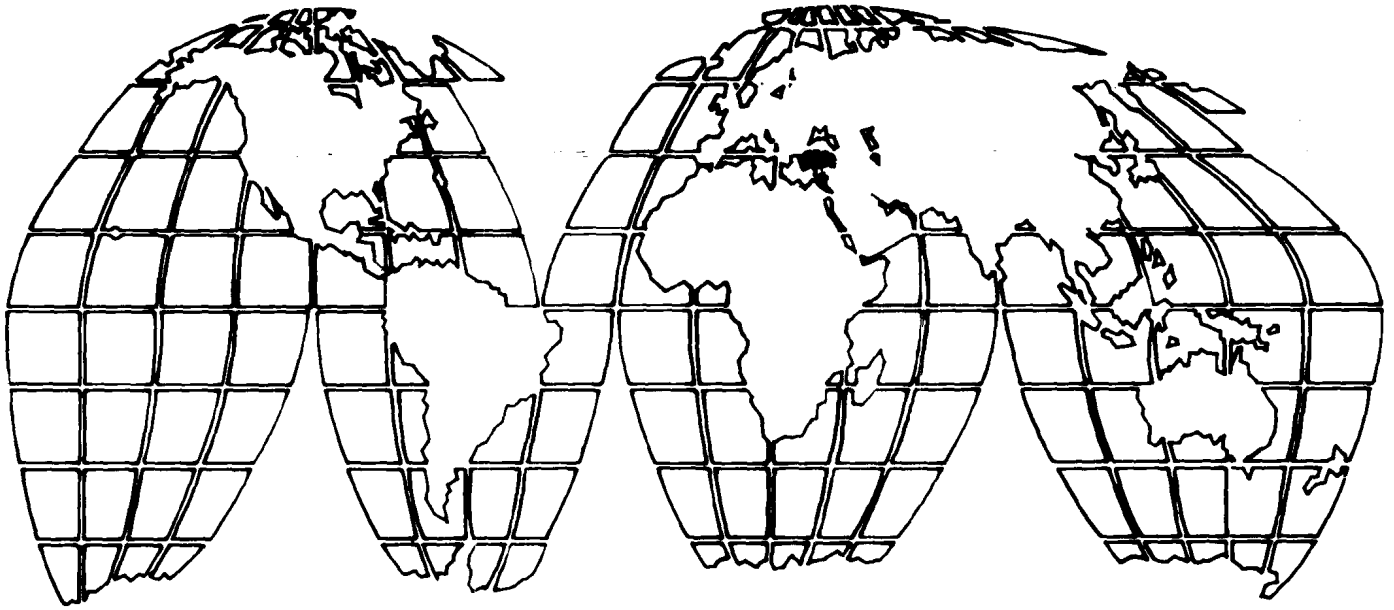
A.I.D. Project Impact Evaluation Report No. 50

On-Farm Water Management In Aegean Turkey, 1968–1974



December 1983

U.S. Agency for International Development (AID)

PN-AAL-029

BEST AVAILABLE

ON-FARM WATER MANAGEMENT IN AEGEAN TURKEY, 1968-1974

A.I.D. Project Impact Evaluation No. 50

by

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U.S. Agency for International Development

December 1983

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FOREWORD

In October 1979, the Administrator of the Agency for International Development (AID) initiated an Agency-wide ex post evaluation system focusing on the impact of AID-funded projects. These impact evaluations are concentrated in particular substantive areas as determined by AID's most senior executives. The evaluations are to be performed largely by Agency personnel and are to result in a series of studies which, by virtue of their comparability in scope, will ensure cumlative findings of use to the Agency and the larger development community. This study of the impact of the AID On-Farm Water Management In Aegean Turkey was conducted in August-September 1983 as part of this effort. A final evaluation report will summarize and analyze the results of all the studies in this sector and relate them to program, policy, and design requirements.

SUMMARY

The Agency for International Development (AID) and the General Directorate of Soils and Water (TOPRAKSU), representing the Government of Turkey, jointly undertook four activities under this project from 1968 to 1974. These included helping farmers to drain, level, and improve their land; assisting local shops to manufacture and maintain farm machinery; encouraging private contractors to do customized work; and training personnel to continue similar activities in the Aydin region initially and later throughout Turkey.

At the time of this project, TOPRAKSU was a small, young, innovative, and semi-autonomous agency, without an elaborate administrative apparatus. It had worked previously with AID.

Turkey's best agricultural area was selected for this project--the province of Aydin. This area has earned its reputation because of its rich alluvial soil, mild climate, and abundant water supply, which have attracted commercial agriculture since the 19th century. Aydin province has more irrigation units on its cultivated lands than do other areas and is one of the largest users of fertilizers and pesticides.

The On-Farm Water Development Project was designed and implemented in the right place at the right time. The Government of Turkey had discontinued cost sharing in the early 1970s and the credit function passed to the Agricultural Bank of Turkey. This was a clear signal that, except for price supports, farmers and entrepreneurs were free to pursue their own profit at their own risk. The private sector maximized invitations to level land and manufacture machinery under this project.

AID/TOPRAKSU project personnel as well as farmers and manufacturers were critical to the project's success. Dr. Atif Attila (TOPRAKSU) and Mr. Marvin Parker (AID) possessed exceptional skills in leadership, technical know-how, patience, and sensitivity. The two concepts, "the farmer as planner" and "learning by doing," were emphasized for all participants.

The project managers used intensive personal contact. Village coffee houses, focal points for socializing and exchange of information among men, were the base of operations. Information gathered through regular visits to demonstration projects was used to redesign or retrain in order to obtain optimal results.

The evaluation team concluded that the lessons to be learned from this project are the following:

1. Demonstration projects are more likely to be replicated if they are clearly successful. Successful agricultural projects are more probable when designed in close cooperation with the farmer/manufacturer/contractor.

2. Farmers are more apt to accept experimentation if their risks are limited. Second crops are less risky than first crops--for example, when double-cropping.

3. Project success is more probable when a complex project is modularized and decision-making is delegated to the lowest practical level. This process is enhanced by a simplified evaluation and feedback system that provides data for prompt adjustments and, when necessary, project redesign.

4. Technology and the requisite equipment for its utilization must be readily adaptable to local conditions and easily repairable at in-country facilities.

5. Project beneficiaries may be more effectively helped through increased employment generated by increased demand for goods and services rather than by direct intervention.

PROJECT DATA SHEET

1. Country: Turkey
2. Project Title: On-Farm Water Development Project
3. Project Number: 277-11-120-426
4. Grantee: Government of Turkey
5. Project Implementation:

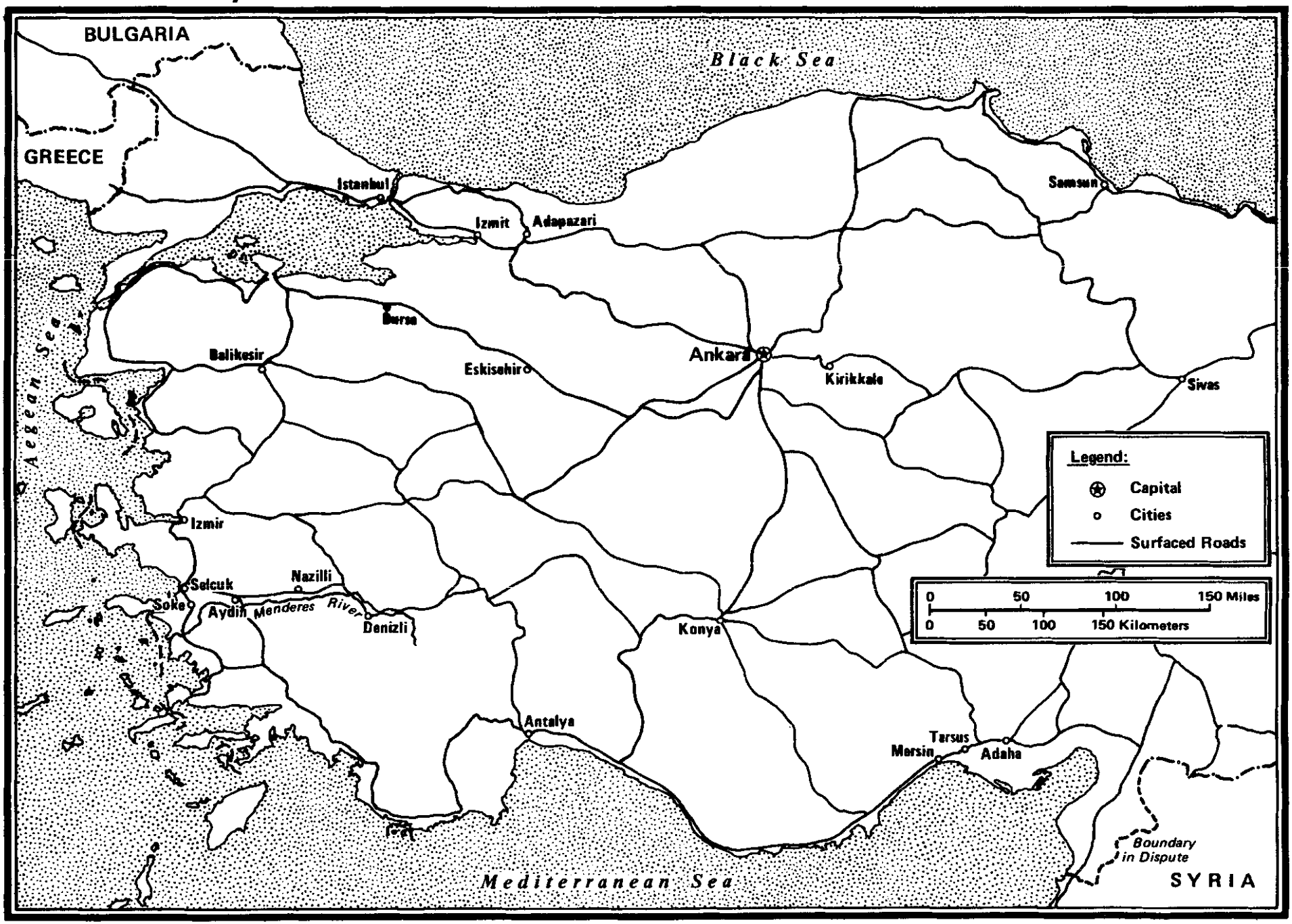
   Initial fiscal year: 1967

   Final fiscal year: 1975

6. Project Funding:

AID	$1,189,000
Government of Turkey	$1,529,000
Total Project Costs:	$2,718,000

Western Turkey



I. INTRODUCTION AND SETTING

In 1968, a subsoiler, a device for breaking through hardpan soil, was put on display in Selcuk, Turkey. Mr. Marvin Parker of the Agency for International Development (AID) had supervised its manufacture, by a local blacksmith, for AID and the General Directorate of Soils and Water (TOPRAKSU). Dr. Atif Attila (TOPRAKSU) noticed a man surreptitiously taking photographs of the subsoiler. The photographer was Mr. Ismail Donder. When Dr. Attila accosted him, he admitted that he hoped to make a copy of the subsoiler, using the photographs as a guide in his welding shop--a typical bazaar shop in a back courtyard of Soke. Mr. Parker and Dr. Attila were looking for just such men; Mr. Parker proceeded to furnish not only design specifications but also technical assistance. These events were the origins of the manufacturing firm, Donder Agricultural Tools and Machinery.

Donder Agricultural Tools and Machinery had be-
actory in an industrial park, with a storage
lometers away, near Soke. Mr. Donder now manufactures a line of machinery that is copied by others, and he exhibits that machinery at trade fairs, for example, in Egypt. Business is brisk.

Mr. Donder's success story is a small part of the On-Farm Water Development Project (277-11-120-426). The project, as it will be referred to hereafter, was a multifaceted program focused on the area around Aydin, Turkey. AID (for the Government of the United States) and TOPRAKSU (for the Government of Turkey) jointly undertook (1) to help farmers to level, drain, and otherwise improve their land; (2) to assist local shops to manufacture farm machinery; (3) to encourage private contractors to do custom work; and (4) to train personnel to continue such activities around Aydin and throughout Turkey. This study is an evaluation of that project.

The project officially began in 1968 and officially ended in 1974. The setting was Aydin Province in southwestern Turkey. Izmir, a city of two million inhabitants, is the metropolis of the region.

Aydin Province has good soils, abundant water, and a Mediterranean climate. The terrain consists of mountainous highlands that are breached by the Buyuk Menderes River. The river valley contains large tracts of alluvial soil.

The province has been not only blessed by nature but also enhanced by man. Turkey's first railroad ran from Izmir to Aydin to Denizli in 1866. Commercial agriculture has existed in the area since the 19th century. Smyrna figs and sultana

raisins were shipped to foreign markets before World War I. Commercial agriculture led to the early formation of agricultural cooperatives. The Aydin Fig Producers Cooperative was founded in 1914. (The Aydin Chamber of Commerce, by contrast, was founded in 1926.) The Aydin Agricultural Sales Cooperative was established in 1933. The Province had 55 agricultural credit cooperatives affiliated with the governmental Agricultural Bank of Turkey in 1972. Commercial success brought relative prosperity, and agricultural mechanization proceeded apace after World War II.

Soke is a town in Aydin Province. A Turkish contractor has remarked that "in the Soke area, you cannot find a poor farmer. For poor farmers, you must go east." This general picture is confirmed by census data. Aydin Province is one of nine provinces in agricultural census Region II. That region's farmers used more tractors, more pesticides, and more irrigation than farmers in other regions in 1980. The region's use of fertilizer was surpassed only by Region I (Ankara) and Region VII (Black Sea Coast). Turkish agriculture, by and large, is led by the region around Aydin Province. This has been true for decades.[1]

Agriculture is vital in Turkey. In 1980, about 60 percent of employment and 60 percent of exports came from the land. (The comparable figures were higher in earlier years.) Turkey is self-sufficient in foodstuffs, but its economy depends on export earnings from agricultural produce while its population grows at about 2.5 percent per year. This has been true for over two decades. Development plans, accordingly, have given a high priority to increasing production in the agricultural sector.

The development of agriculture has aimed at more production per hectare rather than more hectares in production, because there has been no new land to be brought under cultivation since about 1950. (Semi-arid lands to be irrigated in the future are an exception.) This intensification of agriculture--through mechanization, irrigation, fertilizer, pesticides, soil conservation, and high-yielding crop varieties--has been broadly successful. The mechanization of agriculture is evident in the spread of tractors, from less than 4,000 in 1950 to more than 400,000 in 1980. In 1962-1977, irrigated land increased from 360,000 hectares to 2,600,000 hectares (1 hectare = 2.5 acres). The average increase in agricultural production rose from 2.5 percent per year in the 1960s to 3.4 percent per year in the

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[1]Melvin Albaum and Christopher S. Davies, "The Spatial Structure of Socio-Economic Attributes of Turkish Provinces," International Journal of Middle East Studies, 4(1973):288-310.

1970s. The project contributed to that increase in production, but it is not possible to estimate the size of that contribution, given the nature of the official statistics.

The project made a contribution to irrigation and mechanization, in particular, and its general characteristics were conditioned largely by the physical aspects of agricultural production in Turkey and in Aydin Province. In 1962, Turkey had 5,500,000 hectares that were suitable for irrigation in principle, but only 360,000 hectares were actually irrigated. The typical increase in yields is very marked when land is converted to irrigation in a proper fashion. For example, since the climate is mild, double-cropping is possible with irrigation along the coasts of the Aegean and Mediterranean in Turkey. (The rainy season there runs from October to May.) The potential for irrigation was evident, therefore, but so were some problems. Aydin Province is blessed with abundant water, as noted above, so water utilization rather than water availability was the general problem. The province's farmers had experience with irrigation: in 1966, 86,684 hectares were irrigated, 71.2 percent with surface water and 28.8 percent with well water. Those farmers also had tractors; but their land was not level, a layer of hardpan lay below the surface, and the soil was alkaline from salinization. These particular problems were interrelated and caused other difficulties. For example, when a field was not level, the high spots were too dry and the low spots were too wet. To alleviate these problems in Aydin Province and elsewhere in Turkey, land leveling and drainage were needed as was the machinery to carry out those tasks. The magnitude of those needs was beyond the resources of the Government of Turkey.

With respect to irrigation, the Government of Turkey had committed the bulk of its resources to large projects to solve the general problem of water availability. Two agencies were largely responsible for that work: TOPRAKSU and the State Water Development Agency (DSI).[2] DSI, which is far larger than TOPRAKSU, was responsible for big dams, deep wells, major canals, and regional systems. TOPRAKSU was responsible for utilization of water in fields and for assistance to farmers in

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[2]TOPRAKSU now is a part of the Ministry of Village Affairs. (TOPRAKSU began as a part of the Ministry of Agriculture.) DSI is a part of the Ministry of Energy and Natural Resources and is responsible inter alia for the maintenance as well as the construction of networks of canals. These tend to be concrete aquaducts in Aydin Province. DSI is required to compensate farmers for land used for canals--aquaduct pillars occupy less land than trench canals. Farmers pay for water by size of field rather than volume of water.

soil conservation. DSI, as a matter of course, devoted its resources to large projects, but by and large, this was also true of TOPRAKSU: in 1968-1971, 80 percent of its irrigation development investment went into two projects, one in the south (Seyhan) and one in the west (Gediz). A new strategy was needed for other areas, particularly for Aydin Province.

II. DESCRIPTION AND ANALYSIS

A. The Strategy

AID and TOPRAKSU were familiar with irrigation projects and with each other. AID (strictly speaking, its bureaucratic ancestor) had been funding a Land and Water Use Project (277-11-120-149) since 1951. This catch-all project was the predecessor of the On-Farm Water Development Project (277-11-120-426). TOPRAKSU had been founded in 1952 (and separated from the Ministry of Agriculture in 1957). AID viewed it as small, new, innovative, and effective, and had supported its activities with grants for agricultural credit in 1960 and 1963.[3] TOPRAKSU's bureaucratic clout, judging from casual remarks by those familiar with its activities, was enhanced by this (and later) support from AID.

AID/Ankara proposed the On-Farm Water Development Project to AID/Washington in April 1966. AID/Washington remonstrated that a new name and number were not strictly necessary: the Land and Water Use Project could be adapted and extended. AID/Ankara persisted nevertheless, and the On-Farm Water Development Project was approved by AID/Washington in February 1967. The project was scheduled to begin in 1968. But work began immediately; transitional funding was drawn from the soon-to-expire Land and Water Use Project.

AID and TOPRAKSU agreed on strategy and tactics, despite hitches in preliminary negotiations. Both recognized that the increasing need for land leveling, in particular, could not be met by the two governments alone. The project's new name and number were symbols of that shared agreement.

The broad strategy was to activate the private sector: farmers, manufacturers, and contractors. The general tactics were to use demonstration effects: pilot projects so

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[3]The grants were 7,000,000 Turkish lira (LT) in 1960 and 12,000,000 Turkish lira in 1963. The exchange rate was LT 9 = U.S.$1 in 1963.

manifestly profitable as to induce imitation by private parties. TOPRAKSU was to take the lead in this decentralized endeavor. AID was to furnish overseas training, technical assistance, and miscellaneous support.

B. The Style

The project's approach became known as the Izmir Private Investment Strategy. This strategy had a distinctive style in the opinion of participants from TOPRAKSU: "The American style of learning by doing." (The French method of learning by lecturing is said, by informants, to be characteristic of unspecified "other" agencies.)[4] The style was to follow up and follow through on fieldwork. "The hardest thing is to apply a project in the field," according to a former official. The project focused sharply on individual cases in machine shops and farmers' fields. These cases were selected for their growth potential via demonstration effects. The fieldwork required motor vehicles; AID furnished 15. A few of these are still in service, but the fleet has declined since the days of the project. This decline currently restricts fieldwork.[5]

The project's style required a decentralization of decision-making for best results. This decentralization was forthcoming. TOPRAKSU distinguished three types of individual projects: small, medium, and large. Small projects were to be approved at the local level (Aydin), medium projects at the regional level (Izmir), and large projects at the national level (Ankara). The Agriculture Bank of Turkey agreed to a parallel decentralization of lending authority for agricultural credit,

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[4]The team believes the references are to the Ministry of Agriculture. The Ministry of Agriculture is responsible inter alia for crop production, disease control, and extension work. Turkish critics view it as being desk-bound, and it would be irrelevant to this tale except for the fact that coordination with it was urged repeatedly by AID/Washington. AID/Ankara seems to have ignored those urgings for all practical purposes.

[5]TOPRAKSU loses not only vehicles but also field agents in traffic accidents. Several engineers have been killed in recent years. These deaths are related to salaries as follows: TOPRAKSU was authorized to pay its engineers at a higher rate than the standard rate for Government service, but this dispensation ended a few years ago. TOPRAKSU officials now worry about their ability to recruit the good engineers of the next generation, particularly since "a desk job is safer," according to one official.

and this agreement was set forth in an interagency protocol of September 1969 (revised October 1973). This decentralization has endured to the present day. In 1982, the distinctions were among projects that cost less than LT 500,000, between LT 500,000 and LT 1,000,000, and more than LT 1,000,000 (175 LT = U.S.$1 in October 1982).

C. The Means

Credit for farmers was indispensable for the project. Cost-sharing was envisaged in early plans.[6] TOPRAKSU and farmers were to share the cost of improvements equally. Limited authority for cost-sharing was forthcoming, but cost-sharing legislation was a casualty of Government instability in the early 1970s. Cost-sharing was available for only a few years, and then the farmers were told that there would be no such funding in future; its demise enhanced the importance of profitability and the agreement with the Agriculture Bank of Turkey.

The current process for provision of credit moves with surprising rapidity. Any farmer may apply for a land improvement loan from the Agriculture Bank. The largest number of applications is for land leveling, but pumping water from underground sources accounts for slightly more credit. (Agricultural credit cooperatives normally lend money for seed, fertilizer, and pesticides, but not for land improvement.) The Bank's approval of a loan depends on an assessment by TOPRAKSU of the proposed improvements. Final approval, at the appropriate level, is by a joint committee of the Bank and TOPRAKSU. These committees meet weekly. (According to law, an application must be processed within 45 days.) The local branch bank is authorized to extend the credit when a loan is approved, and it notifies the farmer and TOPRAKSU. The actual implementation of a project is then monitored by TOPRAKSU.

For a loan, the worth of a project rather than the wealth of a farmer is decisive in theory, but it is difficult to determine if this is the case in practice. Less affluent farmers do have some handicaps: 10 percent of the cost of the project, for example, must be put up by the farmer.[7] (The Agricultural Bank, if it approves a loan, also receives a first

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[6]The cost-sharing proposals were modeled on the example of the United States. For agricultural credit, see Appendixes E and H.

[7]TOPRAKSU's work is known to poor farmers, but in interviews their phrasing was less "when it happens" and more "if it happens."

mortgage.) The interest rate on agricultural loans rose from 8 percent in 1974 to 19.5 percent in May 1981. But those interest rates were less than the average inflation rate of 29.7 percent per year in the 1970s.

TOPRAKSU, in addition to influencing the allocation of credit, also used two types of contracts as financial levers: (1) contracts with manufacturers for machinery and (2) contracts with contractors for custom work (primarily land leveling). The project used such credit and contracts with skill; and farmers, manufacturers, and contractors responded to those financial rewards. (Further details are given in the sections on manufacturers and contractors.)

The Government of Turkey, aside from the aborted effort at cost-sharing, did not change its policies with respect to agricultural subsidies.[8] No change was needed for the project. Subsidies had responded to the political demands of the rural sector since at least 1950. The presumption and reality of such responsiveness were vital for the success of the project, but despite their importance, they were a constant--not subject to manipulation--from the point of view of the project. Farmers had a realistic prospect although not an assurance of profit, and that continued to be the case. (The team was informed that small farmers pay neither income taxes nor property taxes in Turkey.)[9]

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[8]"Turkish governments have a long tradition of supporting agricultural products; such crops as wheat, sugar beets, tobacco, hazelnuts, tea, and cotton are among the more important ones. ... Other less important crops that enjoy support prices are sunflowers, dried sultanas, dried grapes, and pistachios." Metin Berk, "Public Policies Affecting the Distribution of Income Among Cotton Producers in Turkey," in Ergun Ozbudun and Aydin Ulusan (eds.), The Political Economy of Income Distribution in Turkey (New York: Holmes & Meier Publishers, Inc., 1980), pp. 257, 265. Aydin Province's crops are summarized in Appendixes I and N.

[9]Farmers are sensitive not only to the level of subsidies but also to the pattern of payments. In 1982, for example, 25 percent of the value of a crop was paid on delivery to the Government, 75 percent was paid in three equal installments over the next six months. When a burst of inflation massively discounted the value of future payments, farmers reportedly faced a prospect of widespread losses. (The rate of return on savings in banks was 50 percent per year in October 1982.) The Government of Turkey responded by doubling the initial payment to 50 percent in September 1982.

D. The Personnel

The project was seen as a major undertaking, despite its relatively small budget.[10] The potential achievement was self-sustaining growth, powered by the private sector and guided by TOPRAKSU. For this purpose, as noted above, decision-making was decentralized. The project was run by on-site personnel, with support from AID/Ankara and TOPRAKSU/Ankara. This facilitated the pursuit of targets of opportunity such as Mr. Donder.

Dr. Attila and Mr. Parker were chiefly responsible for the implementation of the project. TOPRAKSU put Dr. Attila in charge of farm extension operations. AID recruited Mr. Parker, from outside the Agency, as the farm machinery adviser. These men fit the style of the project. Both were committed to learning by doing, on the farm and in the shop.

Dr. Attila, like a number of his colleagues, had studied at Utah State College. (We called them "the Boys From Logan." There apparently was an alumni effect with positive results.) He worked directly with farmers at the village level, using coffeehouses as his point of contact, since Turkish farmers live in villages and go out to cultivate their fields.[11] For maximal demonstration effects, a quick first success in any particular area was judged to be very important. Personal commitment and individual involvement by participating farmers were critical in the selection of pilot projects by Dr. Attila. His focus was on owner-operators who were progressive farmers--neither too rich nor too poor--rather than absentee landlords or their resident foremen.

Mr. Parker was the adviser on farm machinery throughout the life of the project. He worked directly with manufacturers and farmers on the construction and use of equipment. His exploits have become the stuff of legend: "Given sheet steel, he could make anything." "He could even teach girls how to weld in a few hours." "He broke his arm in a field one day, and the next day he was back in the same field." His focus was on owner-operators of machine shops rather than professional managers of industrial plants.

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[10]AID spend a total of $1,189,000. The Government of Turkey spend a total of $1,529,000. TOPRAKSU, as noted above, spent 80 percent of its irrigation improvement budget on two other systems during the project's first four years.

[11]Brian W. Beeley, "The Turkish Village Coffeehouse as a Social Institution," The Geographical Review, LX(4) (1970):475-493.

Dr. Attila and Mr. Parker were assisted by a small staff--some of whom had taken the first short courses--chosen with care by TOPRAKSU. This project team was distinguished by its esprit de corps. AID provided a separate building for the team in Bornova, near Izmir.[12] The separate building perhaps enhanced morale but certainly promoted concentration on the project. AID also provided short-term consultants from time to time.[13]

E. The Trainees

Staff training was an integral part of the project. This took two forms: (1) overseas training for six months or a year in the United States and (2) in-service training with short courses in Turkey. The overseas training in various aspects of irrigation systems ended with the project. Turkish in-service training, however, has continued to the present day. A total of 74 persons, primarily engineers, received overseas training from 1968 to 1974. TOPRAKSU's short courses trained 76 engineers and 143 assistants from 1968 to 1979. Not all of these people have stayed with TOPRAKSU. Some have died, and some are now in agribusiness as executives or consultants. TOPRAKSU officials, nevertheless, consider the training program to have been very successful. The trainees are said to have carried the spirit of the project with them throughout Turkey.

From the point of view of the project, farmers, manufacturers, and contractors could also be viewed as trainees, in a sense. These groups, focal points for fieldwork, are discussed in the following sections.

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[12]AID/Ankara urged the separation of the project. AID/Washington, however, had other views; see footnote 4. Project personnel could not be moved to other tasks, at least not easily, as a result of their separate location.

[13]We have read several reports by such consultants, and although always of some interest, those reports often emphasized state-of-the-art technology rather than self-sustaining improvements. As a result, the project often ignored such reports in practice. The hydraulic scraper is a cautionary example. See the discussion of manufacturers in Section G.

F. The Farmers

The project pivoted about profits for farmers from leveling, drainage, and so forth. The potential was substantial, as shown by a study of four farms in Aydin Province in 1971.[14] The average increase in cotton yields was 1,500 kilograms per hectare at LT 3.5 per kilogram. The average decrease in production costs was LT 1,000 per hectare. Land improvements, a one-time only expense, cost LT 2,350 per hectare. The return on the investment, thus, was over 200 percent (LT 6,250/LT 2,350 = 2.66) in the first season. The factor effects on yield increases were distributed approximately as follows:

Land leveling	30%
Effective application of irrigation water	10%
Drainage, including subsoiling	15%
Modern tools and equipment	15%
Crop rotation and fertility management	30%

Cotton was the leading cash crop in Aydin Province. The rate of return for other crops was less marked, but still substantial. Land improvement not only doubled yields in the traditional season, but also created a second season for a second crop. Double-cropping increased seasonal employment for agricultural laborers, particularly at harvest times. Double-cropping also led to a boom in the production of fruits and vegetables, and today the problem is packaging and marketing for melons, eggplants, tomatoes, and other perishables. Crop forecasting is virtually nonexistent.[15]

The project intention was to make manifest the potential profit and to make available the requisite machinery and custom work. Dr. Attila proceeded farmer by farmer, field by field. He sought individuals who would follow through; that is, those who would continue to apply the new techniques not only in the demonstration field but also in their other fields. For demonstration purposes, the ideal farmer was not only progressive but also influential--a farmer who would talk about a success

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[14]AID/Ankara staff study (no author, no title, no date [circa 1972]). For cotton, the benefit/cost ratio of land improvements is 2.3, according to Berk, op. cit., p. 257.

[15]Crop forecasting refers to a cycle of information that begins with a survey of farmers' planting intentions. Harvest projections and market estimates are based on those initial intentions. The intentions, projections, and estimates are disseminated to farmers. A new survey is then made of planting intentions, and the cycle continues.

if it occurred and who would be heard rather than ignored in the coffeehouse. Participating farmers decided themselves what innovations to try in their fields, in consultation with field agents from TOPRAKSU. "The farmer as planner" became a slogan of the project.

These farmers usually were neither particularly rich nor particularly poor, but they could afford to risk a field of one to four hectares in the experimental project.[16] The risk was minimized for farmers by the introduction of new rotation crops in the second season rather than the traditional season and by leveling single fields rather than entire farms.[17] This did not remove all risk; crop failures and market fluctuations were still hazards.

The actual leveling of a demonstration field was a community event with dozens of farmers in attendance from nearby villages. TOPRAKSU surveyed the fields, furnished the equipment, and provided cost-sharing for the first demonstration fields. But with the abolition of cost-sharing and the development of manufacturers and contractors, it reduced its role. Today, it still surveys some fields, rents some equipment, and recommends some loans from the Agricultural Bank of Turkey, but many farmers now proceed on their own, without assistance from TOPRAKSU. This self-help is seldom recorded in official statistics, but it is a sign of the success of the project.

TOPRAKSU assisted 95,859 farmers to level 323,815 hectares from 1968 to 1979. Project figures are included but not itemized in those totals for all of Turkey. (The hectarage is roughly equivalent to two counties in the State of Iowa.) These statistics omit custom work by private contractors and personal work by individual farmers. Those omissions are substantial. As a consequence, we cannot estimate either the number of farmers or the number of hectares that were affected,

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[16]Aydin Province is an area with farms of modest size, compared with those in eastern and southern Turkey. A small farm is less than nine hectares, a medium farm is nine to 15 hectares, and a large farm is more than 15 hectares, according to Berk, op. cit., pp. 251-252.

[17]Farmers' fields are scattered in Aydin Province. TOPRAKSU has fostered the consolidation of fields to make compact farms. This was a followup to the project. Sevindikli Village (near Nazilli) was the site of a land improvement and consolidation project from 1976 to 1979. See Appendix F.

directly or indirectly, by the project. But the numbers are large and still growing.[18]

G. The Manufacturers

The project stimulated the local manufacture of agricultural machinery. Mr. Parker worked closely with (and in) local shops to introduce designs and techniques for the production of new implements. These shops--machine shops, welding shops, blacksmith shops, and so forth--were small businesses. The equipment was designed to be pulled by the tractors that the farmers already owned, a fact of capital importance.

AID provided designs for a reversible plow, chisel plow, scraper float, land leveler, subsoiler, lister, seed drill, border disk, and mechanical scrapers in three sizes. The mechanical scrapers and subsoilers, in particular, were vital for the leveling and draining of fields. The scrapers moved earth, by scooping and dumping, from high spots to low spots. The subsoilers broke hardpan, so surface water could percolate downwards (leaching out salts and permitting deep root systems). This machinery was easy to build and easy to repair. When a hydraulic scraper proved to be neither easy to build nor easy to repair, its production was discontinued; the prototype models are rusting away.

Mr. Parker worked with interested owners in their shops to make any particular implement. When the equipment was ready, TOPRAKSU arranged a field demonstration for 30 to 50 neighboring farmers. The demonstration also was attended by the manufacturer, of whom the demonstrator would say, "that fellow made it; he can repair it; you see what it can do." TOPRAKSU purchased some of the new equipment and assisted farmers to obtain credit to purchase more of the new equipment. The Ministry of Industry, in some cases, assisted local manufacturers to obtain credit to expand production.

Under this program, Mr. Donder's business was moved from a bazaar stall to an industrial park and was transformed from a welding shop into a manufacturing firm.[19] His experience was not the only example of such success. The local manufacturers

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[18]Land leveling is a thriving business. Business competition from local farmers is so severe that private contractors are said to "have moved away" from a village near Denizli.

[19]Mr. Donder's story is recounted in Appendix G. Photographs are in Appendix D.

of farm machinery, according to a Government official, "have become millionaires."

Dr. Attila and Mr. Parker also encouraged the formation of new companies. Ephesus Agricultural Machinery and Merchandising Corporation, for example, was founded after consultations with them. (Before those consultations, the company's founders had been considering a venture in food processing rather than farm machinery.) The firm, which now has about 250 shareholders, was established in 1974 and production began in 1975. The first product was a farm trailer. The company now markets a range of equipment nationally and internationally. Domestic sales are made predominantly through farmers cooperatives. The company conducts on-farm demonstrations for sales purposes and not only maintains a mobile service unit but also supports a training program for local technicians to service its equipment. Service helps sales.

The annual production of land levelers in Aydin Province increased from none in 1968 to 1,050 in 1979. The annual production of all types of farm machinery in five Aegean provinces, including Aydin, increased from 7,683 implements in 1968 to 43,934 implements in 1982. Unfortunately, the project's direct contribution to those increases in production cannot be extracted from the official statistics. AID-designed equipment, however, is still in production by local manufacturers who make adaptations as needed. Mr. Parker, in particular, was recalled with enthusiasm by many of our interviewees.

Local production of farm machinery is now well established. New equipment is being introduced and old designs are being modified by local producers, although some needed equipment is not yet manufactured--for example, a potato harvester. Exports go to Pakistan, Iran, Iraq, and elsewhere in the Middle East. Turkey now has about 700 private manufacturers of farm machinery; perhaps 15 are big companies. No bankruptcies were reported to us, despite repeated inquiry, but competition is said to be fierce, particularly since the advent of high interest rates in recent years. Sales, not production, are the current problem.

H. The Contractors

The project, with its increased yields and second crops, quickly demonstrated the advantages of land leveling. TOPRAKSU arranged credit and surveyed fields, but it did not level much land, except for demonstration plots. Many farmers lacked the time, equipment, or inclination to do the job themselves. Thus, the project created a demand for land leveling. Private contractors emerged spontaneously to meet the new demand.

TOPRAKSU encouraged the emergence of contractors with its short courses on land leveling and land surveying, by newsletter advertisements for sealed bids on its projects, by paying market rates for land leveling, by renting equipment to contractors, and by licensing contractors. This support was phased in during the life of the project, and it has continued to the present day. By 1982, more than 150 private persons had taken at least one of the short courses. TOPRAKSU expected 15 to 20 bids on a typical project advertised in its newsletter, and it had 30 scrapers available for renting at its engineering station in Aydin. TOPRAKSU now requires that contractors be licensed for its projects, and although a license is not strictly required for a private project, farmers are said to have become skeptical of unlicensed contractors.

There is no record of the number of contractors or the amount of work by contractors, but the growth of contracting was rapid. No contractors were doing land leveling in the mid-1960s. The first contractors were local farmers, using the new equipment, who contracted with their neighbors during the late 1960s. By 1982, contractors ranged far afield--regionally, nationally, and internationally (Syria and Iraq). Bahattin Goren (Istanbul) is a big contractor who began with highway, housing, and dam construction. He added irrigation work in the early 1970s. His firm uses subcontractors who hire farmers, with tractors and scrapers, from the highlands of the Aegean region. Those farmers have been trained, directly or indirectly, by TOPRAKSU. We spoke with such a sub-subcontractor who was working on a project for TOPRAKSU. He previously had worked for four years in Iraq on land leveling for Bahattin Goren. Istanbul newspaper advertisements were one source of land leveling jobs for that sub-subcontractor.

A variety of contractors are now operating in the coastal regions of Turkey: (1) local farmers who contract locally; (2) Anatolian farmers who contract outside their region during their off-season; (3) contractors with scrapers who rent tractors in the area of a project; (4) contractors with tractors who rent scrapers (sometimes from TOPRAKSU); (5) big companies, with a variety of equipment, that do not bid on small projects (there were about 15 such firms in Turkey in 1982); (6) entrepreneurs, with no equipment, who rely on subcontractors; and (7) subcontractors, and their extended families, who have a number of tractors and scrapers. (A few persons have purchased tractors and scrapers for the sole purpose of doing custom work.)

These contractors employ men and boys as young as eight years old. A big project--say, several thousand hectares with one entrepreneur and several subcontractors--may take months to complete and may employ at any given time as many as 50 operators with tractors and scrapers. These operators are farmers

taking employment in their off-season. New jobs have been created but old jobs have not been destroyed by these contractors.

Land leveling is a modular operation in this setting. Water movement by surface flow and earth moving for economic reasons have an upper limit of about 200 meters. (The actual limit may be somewhat less, depending on the character of the local soil.) The maximum module, therefore, is about four hectares. A small project is less than the maximum module; a big project has many such modules.

For individual farmers, the big project is the leveling of a field for the first time. The maximum amount of earth is moved at first leveling. Thereafter, given proper care, the field needs to be re-leveled in a recurring cycle of five or six years. Proper care includes plowing one way with a reversible plow and smoothing with a land leveler. TOPRAKSU recommends that a field be smoothed each crop season with three passes of a land leveler. Farmers, however, often make only the last recommended pass, in the direction of the downward slope. This practice seems likely to increase with the cost of gasoline, although it shortens the cycle for re-leveling. The recurrent need for re-leveling suggests that the future prospects are quite good for private contractors, but there may be a shake-out period after the demand has been met for first levelings.

I. The Side-Effects

The project achieved its intended effects. Productivity and employment were increased in farming, manufacturing, contracting, and within TOPRAKSU. There also were side-effects, some good, some bad. These can be summarized briefly.

1. The project increased the distribution of water as intended, but figs unexpectedly proved to be extremely sensitive to moisture (humidity as well as ground water). The quality of the fruit so deteriorated in some areas that large parts of the crop could not be sold. As a result, fig orchards are being uprooted in the lowlands, and those fields are being planted with annual crops. New fig orchards are being planted on the hillsides.[20]

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[20]The situation was caused in part by a land law of 1946. The law envisaged the confiscation of all unplanted land. Farmers, in a rush to avoid confiscation, planted fig trees in many unsuitable places. The project's indirect effect on the location of fig orchards, thus, may be beneficial in the long run.

2. The project's success with water distribution also caused the spread of crop diseases. These diseases increase the risk of crop failures and put a premium on crop rotation, selective use of pesticides, and so forth. TOPRAKSU is coping with this problem, but its magnitude was not anticipated. (Malaria, however, apparently has not increased.)

3. The project increased the production of crops as intended, but inevitably, overproduction has resulted in some years for some crops. Crop forecasting, packaging, and marketing have become pressing needs; as yet, those needs have not been satisfied.

4. The project also contributed, albeit indirectly, to changes in the style of life in the villages around Aydin.[21] Rural electrification is now widespread. Electric lights, running water, refrigerators, and television are now found in many homes. Diets and health have improved. The traditional structure of work roles is changing gradually. Women still pick cotton, but now some drive tractors and others repair pumps. Prosperous families now send some children to lycee and college.

III. CONCLUSIONS AND LESSONS LEARNED

A. Conclusions

The project, in the words of the aphorism, was the right project in the right place at the right time. Government officials and private persons who are familiar with the project's operations in detail, believe that more was attempted and more was accomplished than would have been either attempted or accomplished without American aid. We believe that it was very successful.

The project improved farming methods, commercial crops, farm machinery, and double-cropping in the area around Aydin Province. The innovations proved to be self-sustaining, and, by and large, they augmented rather than replaced the goods and services that were in existence before the project. This

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[21]Professor Kolars first visited this area in the late 1950s. His general impressions from our recent visit are summarized in John Kolars, "Turkey Revisited," Christian Science Monitor (November 22, 1982), p. 23.

additive (rather than replacement) character was important because it minimized the adverse side-effects.

AID was a catalyst of TOPRAKSU. The import of ideas was primary; the import of equipment was secondary. Private sector profits, decentralized decision-making, cost-sharing, machinery designs, learning by doing, and followup and followthrough were given pride-of-place by AID. The "Boys From Logan" took the ball and ran with it.

The tactics fit the tasks: (1) the careful selection of individuals for demonstrations; (2) the personal involvement of individuals--farmers and manufacturers--in the planning of changes in their operations; (3) the minimization of risks through the use of second crops and government contracts; (4) the provision of goods and services by the private sector rather than state enterprises; and above all, (5) the modularization of tasks, that is, the tactic of always starting small and sometimes failing small. These tactics contributed to the success of the project.

Finally, the personnel on the spot made the decisions. The project team was very strong. Dr. Attila and Mr. Parker did an exceptional job as team leaders.

B. Lessons Learned

What lessons can be learned from the experience of this project? We would emphasize the following:

1. The risks should be spread or minimized in a project--for the local participants, for the host government, and for AID.

2. Projects should be decentralized. A segmental approach minimizes the consequences of stray failures. A failure that is small and localized is a failure of a part rather than the whole of a project.

3. The host government should insure its citizens against the downside risks of project participation--wipe-out possibilities--by contract guaranties, subsidy floors, easy credit, or other means. Such de facto insurance should not be confused with "footing the bill."

4. A modular approach to individual participation is optimal. Limited participation by a farmer--say, a single field--minimizes his risk in the short term and, if successful, maximizes his followthrough in the long run. A farmer, to paraphrase a cliche, should

not be expected to put all of his eggs into a new basket.

5. If it is to have a successful demonstration effect, a pilot project must succeed unambiguously. An initial failure can become the proverbial albatross because the memory of failure is difficult to overcome in future demonstrations. Success breeds success by imitation. Failure is shunned by observers.

6. A pilot project should be designed to ensure a quick first success. Local participants should help to plan as well as to implement a pilot project. To achieve demonstration effects, the place and people should be chosen with probable success rather than pressing need as the chief criterion: personal commitment is particularly important. Owner-operators--neither too rich nor too poor--are better bets than absentee landlords.

7. Project equipment should be easy to repair. What is easy, of course, depends on the production capacities, equipment wear-and-tear, and repair facilities of the local setting. Sand in the gears is a metaphor with meaning for development.

8. The composition of the project team in the field is absolutely vital. The team should be selected with care, culled if need be, and then left on the job for the life of the project--with authority to pursue targets of opportunity. The team should have the power to plan at least the details of the project as it evolves. Furthermore, physical vigor is important in fieldwork, and followup is an attitude of mind as well as a presence on the spot.

9. A successful project, by its very success, causes further problems. These should be anticipated. Will this project, if successful, cause more trouble than it is worth? This question should always be kept in mind by project planners.

10. The implementation of projects in the field--rather than the movement of large quantities of money--is the heart of development. AID career patterns and incentives should reflect that fundamental fact.

APPENDIX A

LOGICAL FRAMEWORK FOR ON-FARM-WATER DEVELOPMENT (277-11-120-426)[1]

Goal

To increase farmers' yields while decreasing production costs

Goal

To improve the relationship between the farmer and his land and water resources in Aydin Province in Turkey

Purpose

To introduce techniques of irrigation systems management, on-farm water management, land preparation, land treatment, and tillage

Outputs

-- Farmer credit provided
-- 74 persons trained by AID
-- 219 persons trained by the Government of Turkey
-- Modern tools and equipment manufactured

Inputs

-- 15 motor vehicles
-- Project implementation personnel
-- Designs for modern tools and equipment

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[1]Reconstructed from project files.

APPENDIX B

METHODOLOGY

(by James Wilson)

The documentary background for this study was very good. The team received approximately a six-foot shelf of official cables, project papers, Government reports, manufacturers handbooks, provincial yearbooks, journal articles, and scholarly articles and books. (The Turkish language publications were reviewed by Professor John F. Kolars.) This documentary material was reviewed in stages, before, during, and after the fieldtrip to Turkey.

The four-week fieldtrip was made in September-October 1982. The team was based successively in Ankara (1 week), Izmir (2 weeks), and Istanbul (1 week). The fieldwork focused on interviews and site visits, but some documents were also acquired during the fieldwork. Most interviews and site visits were arranged officially by the American Embassy, the Turkish Ministry of Foreign Affairs, and above all, TOPRAKSU. (AID now has no mission in Turkey.) The team supplemented those official interviews with unofficial interviews--which they arranged themselves--with individual farmers, private manufacturers, private contractors, Government officials, and trade associations. Professor Kolars, in particular, was able to conduct extemporaneous interviews with old friends and chance acquaintances. We covered a broad spectrum in our interviews but did not attempt to interview a random sample.

APPENDIX C

ITINERARY

(by James Wilson)

Upon its arrival in Ankara, the team followed the itinerary already communicated to the American Embassy in Ankara. We visited the First Secretary of the Economic Section, Mr. Lawrence Benedict, and met with Mr. Yusuf Durusoy, agricultural specialist, and Mr. Yakup Aksiyote, who is responsible for AID matters. We also met with Mr. Ertugrul Y. Gur, senior commercial specialist. The Turkish Foreign Ministry invited us to meet with Mr. Selahattin Alpay, Director of the Economic Office, and Mr. Volkan Ural, Director of Foreign Relations with East-West countries. After these preliminary meetings, we concentrated on discussions with senior TOPRAKSU officials, namely, Mr. Huseyin Yegin, Undersecretary for TOPRAKSU in the Ministry of Village Affairs and Cooperatives; Erdogan Bilgi, General Director of TOPRAKSU; Mr. Mustafa Epikman, Director for Planning and Technical Affairs; and Mr. Ali Evirgen, also of the Planning Section.

TOPRAKSU kindly provided us with the valuable services of Mr. Epikman and Dr. Atif Attila, former TOPRAKSU horticulturalist and now a leading private agricultural consultant, and a vehicle and a driver for an extensive and intensive series of field visits in the Aydin region. We were forced to condense our interview schedule because of the major religious holiday (Kurban Bayrami) from September 25 through October 3. There were almost no businesses open during the preceding and following weekends, i.e., September 25-26 and October 2-3. We managed to interview TOPRAKSU officials in Denizli and businessmen in Kemalpasa on Friday, October 1, as well as two retired extension workers who had participated in the Gediz Project.

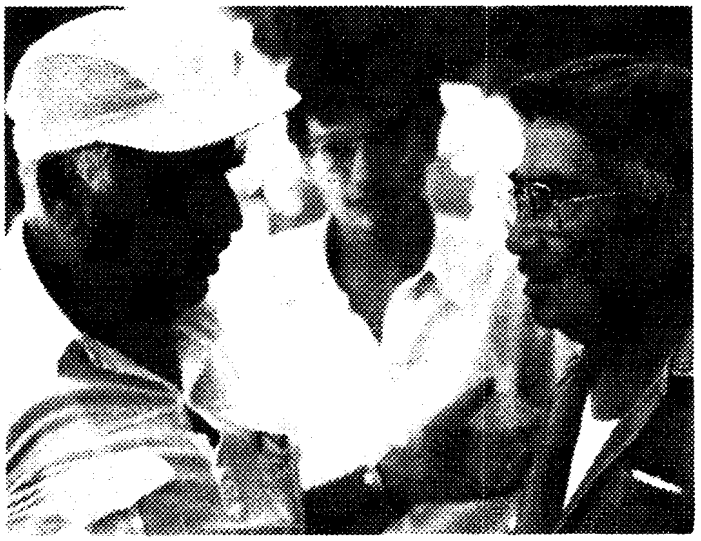
Through personal contacts outside TOPRAKSU, we also held intensive interviews in the village of Yukarisamli near Denizli and with a poor farmer from Yenikoy during the Bayram. Otherwise, time was spent discussing our impressions, perusing the extensive documentation gathered in Turkey, and drafting a preliminary outline. We left by boat for Istanbul on Sunday, October 3 and arrived the next morning. After checking in with the U.S. Consulate, we again discussed writing responsibilities, and after finalizing travel arrangements for our return to the United States, we began writing the final report Monday afternoon, October 4. We met with the Consul on Tuesday, and for the remainder of the week we discussed our preliminary findings and also discussed, revised, and rewrote our initial report and its conclusions. During this time, we also interviewed Mr. Samim Oztek, General Manager of Iraqi Projects of Bahattin Goren Company, a major international contractor.

APPENDIX D

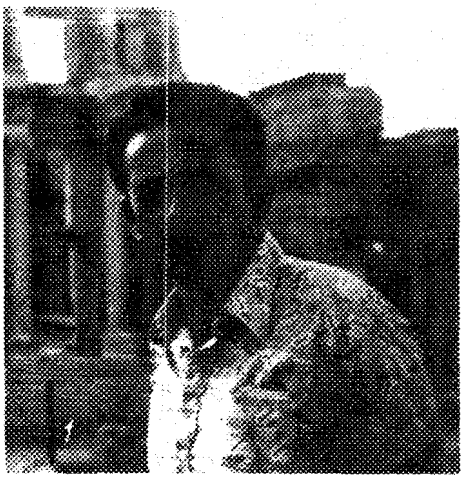
PHOTOGRAPHS

(by James Wilson)

Mr. Ismail Donder with a planter outside his small factory in Soke.



Dr. Atif Attila, on the left, with Mr. Oz who was one of the first private sector equipment manufacturers connected with this project. Dr. Attila's assistant looks on.

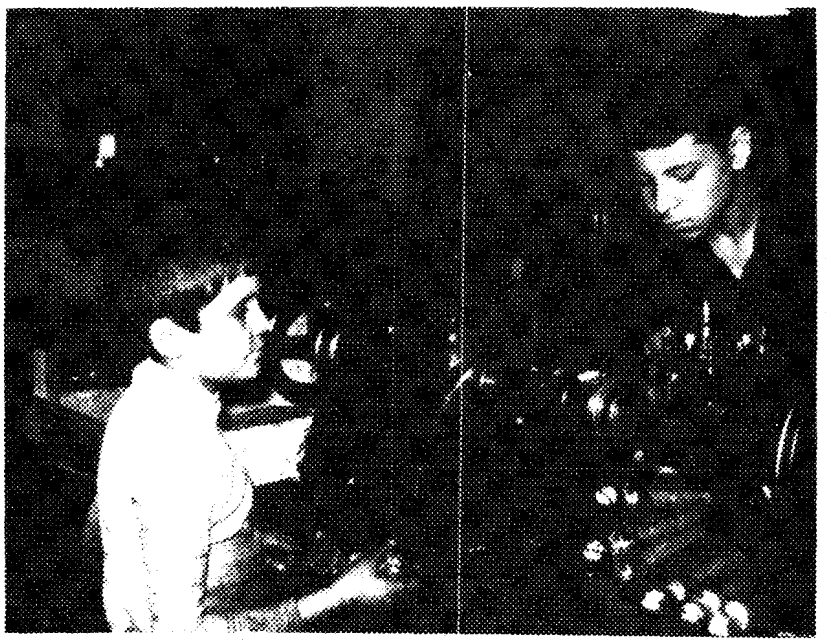


Mr. Mustafa Epikman, Director for Planning and Technical Affairs (TOPRAKSU) our guide for our visits to project sites.

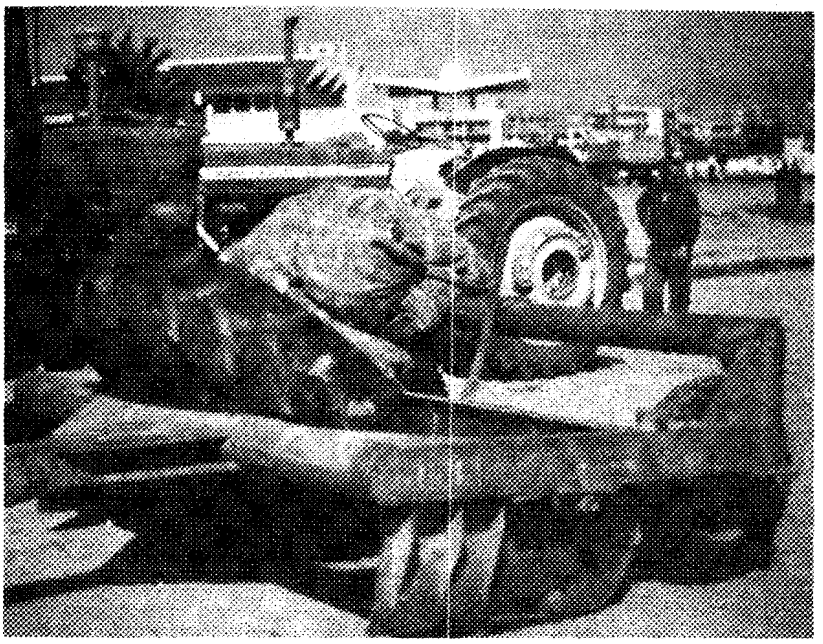
Dr. Atif Attila inspects a chisee plow manufactured and used in the On-Farm Water Development Project.

Inside view of Mr. Azim's factory.

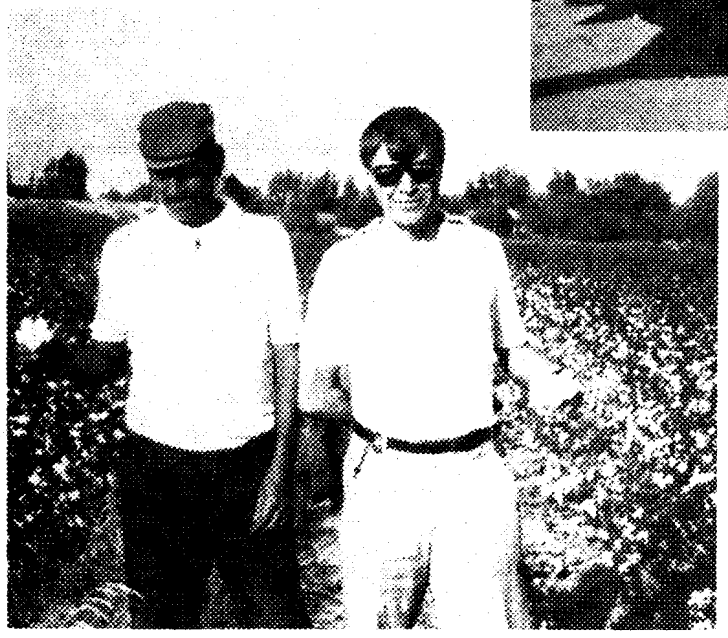
Progressive farmer from the village of Sevindikli.



Young apprentices working in a Soke machine shop.



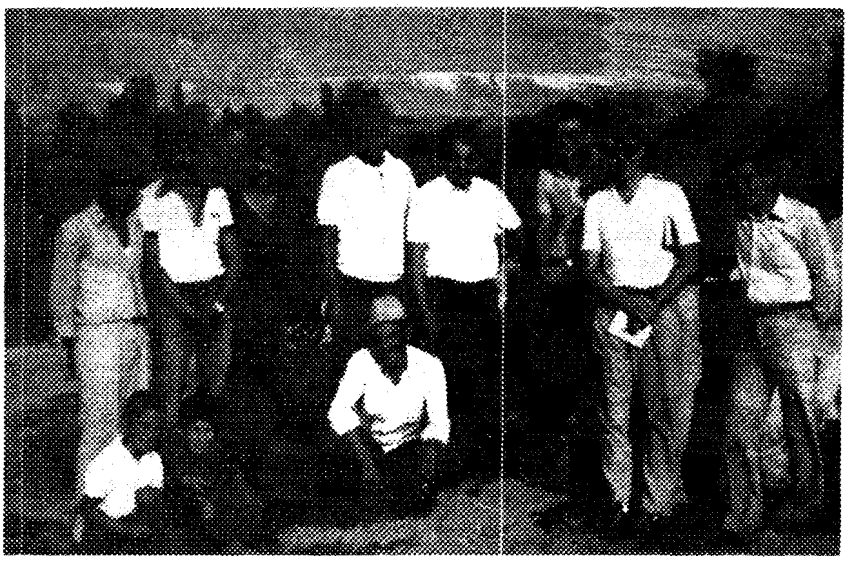
Old mechanical scraper manufactured during the project which is still used by private contractors.

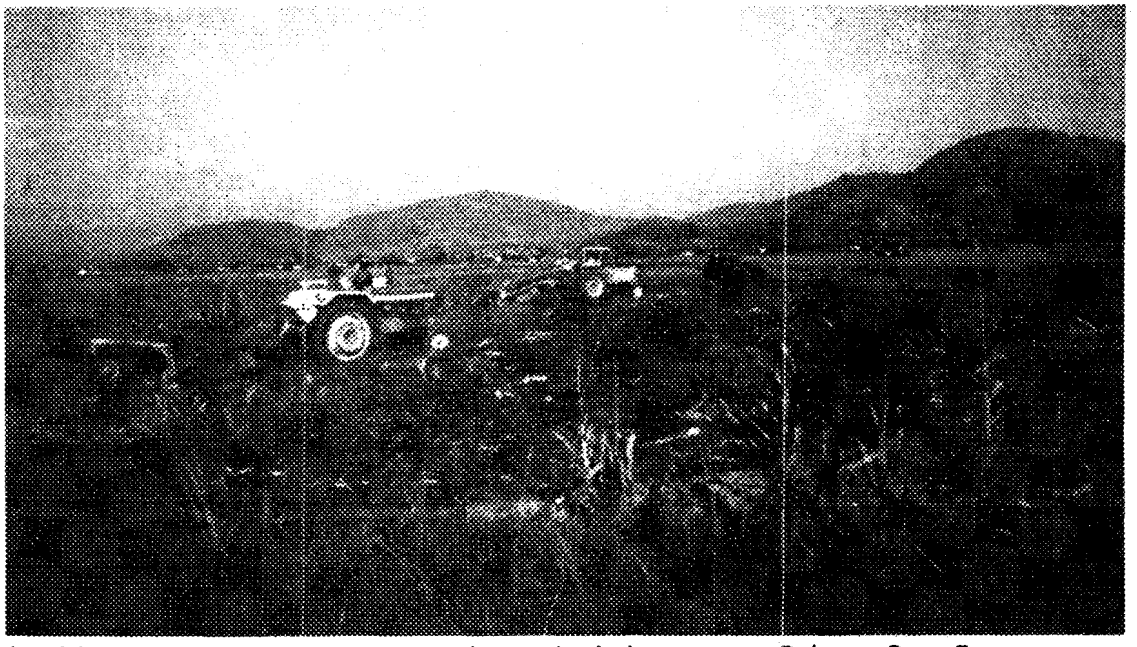


Dr. John Kolars and Turkish farmer standing in a cotton field near the village of Yukarisamli. Dr. Kolars holds a cotton cluster which shows damage from weeds in the right field. The Turkish farmer holds a cotton cluster which shows improved productivity from a sprayed field.

Turkish farmer in adjacent field near the village of Yukarisamli indicates the old (left side) and new concrete (right side) irrigation canals.

Group photograph of Dr. John Kolars and farmers from village of Yukarisamli.



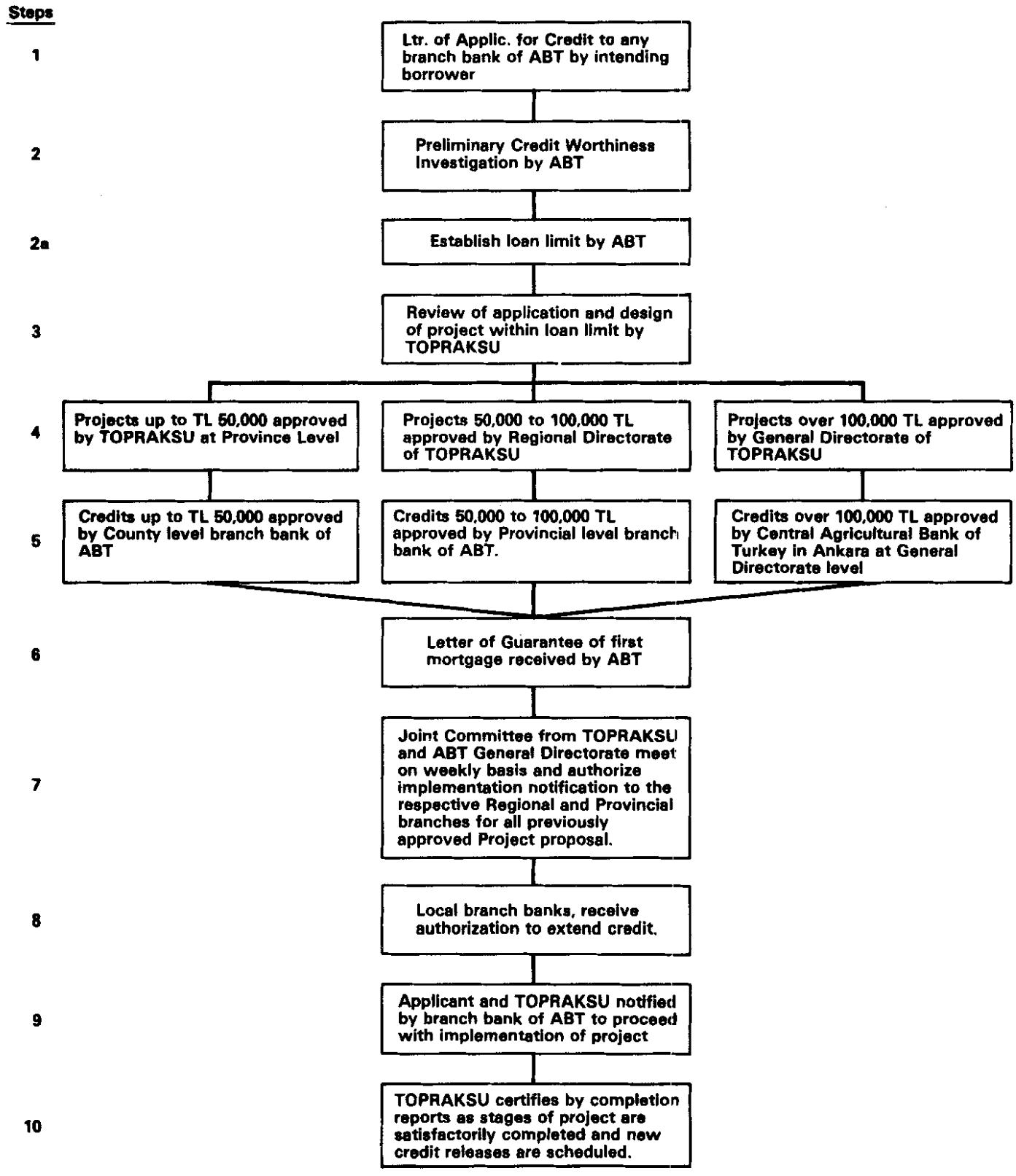


Land levelling by private contractors, with mechanical scrapers, at Dalaman State Farm.

APPENDIX E

SYSTEM OF COLLABORATION BETWEEN ABT AND TOPRAKSU IN PROCESSING FARMERS' LOAN APPLICATIONS

a. System of collaboration between ABT and TOPRAKSU in processing farmers loan applications



APPENDIX F

INFORMATION CONCERNING THE SEVINDIKLI VILLAGE (NAZILLI COUNTY, AYDIN PROVINCE) DEVELOPMENT PROJECT

(excerpted and translated by John Kolars)

Sevindikli village is located on an asphalt road 7 kilometers east and 3 kilometers south of Nazilli (near Denizli). The project includes 5,710 decares for consolidation, leveling, closed-drainage canals, and irrigation canals. It was begun in 1976 and ended in 1979. In addition to the consolidation, leveling, and irrigation of the 5,710 decares, 3,000 decares were given closed drains.

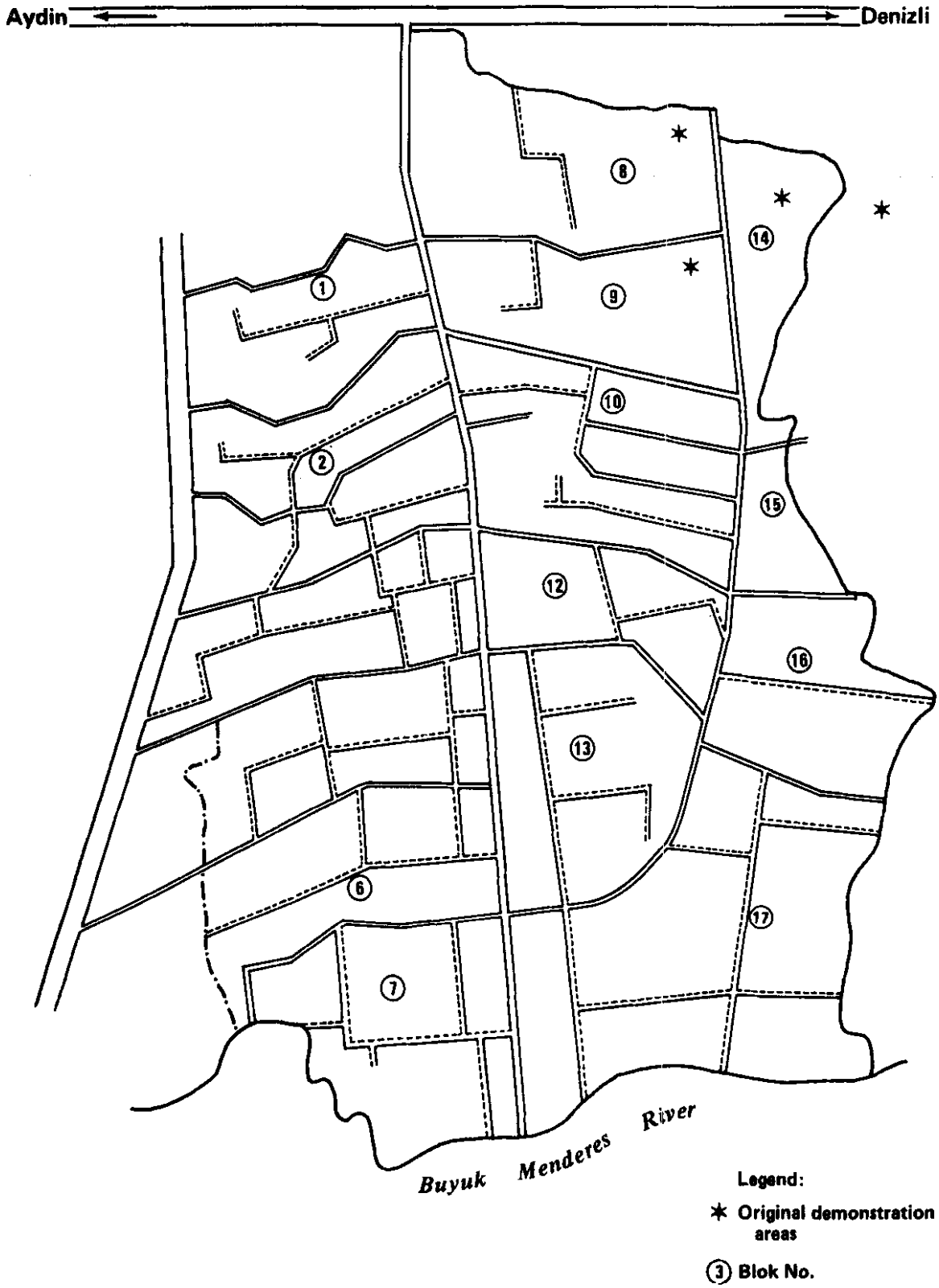
If prices of cotton and tobacco approximate those of 1980, the investment of LT 1 million+ on 5,710 decares of land should ensure a return of LT 30 million.

General Project Information

Project Type:	State Financed
Actual Character:	Development (consolidation/leveling, drainage, irrigation, and extension followup)
Area Size:	5,710 Decares (10 decares = 1 hectare)
Property Ownership:	Individual
Water Source:	DSI Network
Number of Farmers Who Will Profit From This:	254
Estimated Cost:	LT 10,956,682

Dimensions

Number of Preproject Parcels:	472
Number of Postproject Parcels:	375
Preproject Parcel Size:	12 decares
Postproject Parcel Size:	20 decares
Amount Consolidated:	21 percent
Area Consolidated:	5,710 decares
Closed-Drainage Canals:	32,410 meters
Leveling:	5,710 decares
Irrigation Canals:	18,782 meters
Stabilized Roads:	24,000 meters


Aydin
Denizli
1
2
6
7
8
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13
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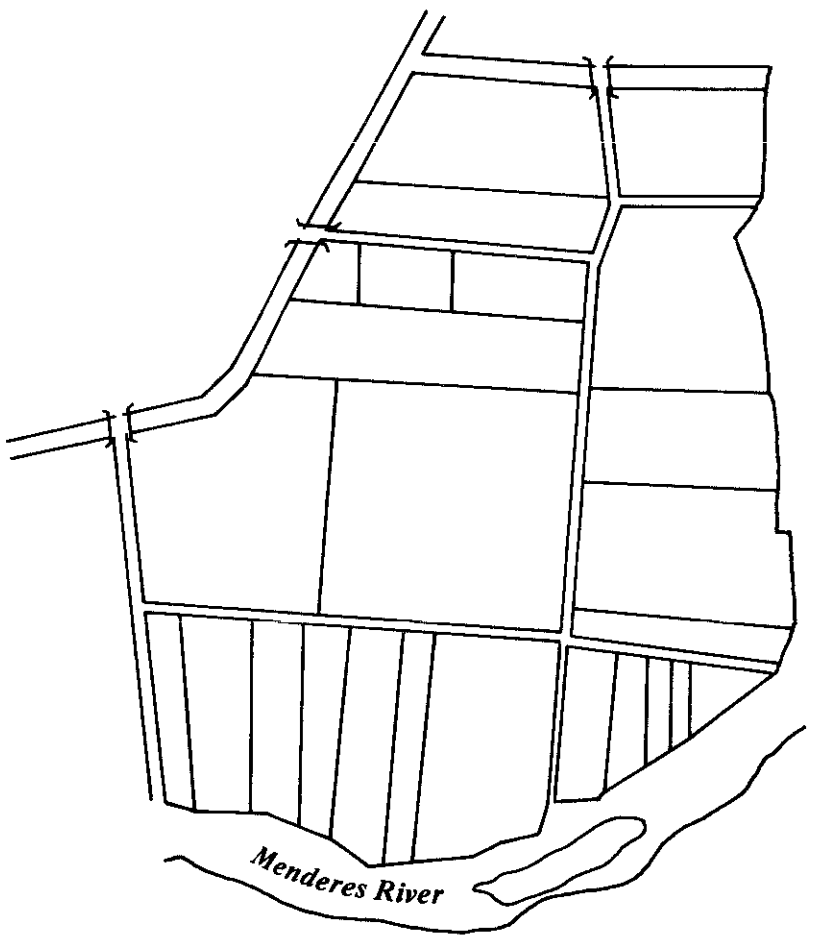
16
17
Buyuk Menderes River
Legend:
Original demonstration areas
(3) Blok No.

Old Situation

New Situation



APPENDIX G

MR. DONDER'S SUCCESS STORY: THE GROWTH OF SMALL INDUSTRY IN AYDIN PROVINCE--A CASE STUDY

(by John Kolars)

Mr. Parker and Dr. Attila approached Hasan Safat, the "one-eyed Blacksmith of Menemen" in 1968 to make a prototype subsoiler for TOPRAKSU. When it was completed, they took the piece to Selcuk where it was put on display (presumably at the time when the first demonstration plots were being shown near there).

While the machinery was on display, Dr. Attila noticed a man somewhat surreptitiously taking a photograph of it. When he approached the photographer, Ismail Donder, and asked him what he was doing, the man rather timidly replied that he operated a small welding shop in Soke and that he wanted a picture of the subsoiler because he thought that with such a photograph for help he could make a copy of the machine. This was exactly the type of entrepreneur--a volunteer--for whom those two were searching. They seized upon the opportunity and told him they would provide the plans and help him to produce such equipment.

Mr. Donder's welding shop was a typical bazaar shop in a back courtyard in Soke and was very small. However, with the help of Mr. Parker and Dr. Attila and a guaranty that TOPRAKSU would purchase several subsoilers, Mr. Donder went ahead. The subproject was successful, and he is now a prosperous manufacturer of farm equipment.

At the time we interviewed Ismail Donder, he had moved his workshop to a new industrial park on the outskirts of Soke. There he has a much larger shop, as well as a large storage depot several kilometers away for completed machines. A former apprentice, named Mehmet Ilgi, operates an independent workshop nearby.

This industrial park was established in 1976. There are 240 small workshops like Donder's and Ilgi's within it. Each can produce about 400 pieces of equipment per year (e.g., two-M^3 scrapers) or about one per day. (Both estimates were given.)

Ilgi's shop has six apprentices to whom he pays LT 20,000 each month (LT 175 = U.S.$1 in late September 1982), plus their industrial insurance (cost undetermined). A scraper sold at retail in September 1982 for LT 150,000. It contains about 600 to 700 kilograms of steel at a cost to the manufacturer of LT 100 per kilogram. The manufacturing costs are summarized as follows:

Steel	
Average Weight of Steel Used in Scraper	650 kilograms
x Cost per Kilogram of Steel = Total	x LT 100
Cost of Steel in One Scraper	LT 65,000
Labor*	
6 Apprentices at LT 20,000 per Month = LT 120,000	
LT 120,000 ÷ 30 Machines = LT 4,000 (labor cost per machine)	
Costs of Materials and Labor	
Per Scraper (see above)	LT 69,000
Retail Price per Scraper	LT 150,000

*Does not include Industrial Insurance costs.

Source: On-site interview.

The industrial park was formed by an occupant cooperative in 1976. Each member took out a loan for LT 350,000 at 5 percent interest on a 10-year repayment schedule. (N.B.: As of 1982, they had four years to go and seemed to be on schedule.) This amount paid for a shop structure and the property but not for its contents. The loan came with the help of the Ministry of Industry (Sanay, Bakanligi) through the Halk Bank.

Estimates of the 1982 value of one shop and property ranged from LT 5 to LT 10 million, a 15-fold to 30-fold increase in value. It was also specifically pointed out by the owners that this increase did not include the owner's ongoing salary, etc.

There seems to be a hiving-off of apprentices and an increase in the number of shops to meet demand for equipment. (Mr. Donder planned to send equipment to a trade fair in Egypt in late 1982.) However, Mr. Donder's former apprentice, Mr. Ilgi, seems much less well-informed regarding interest rates, costs, and marketing than does Mr. Donder. This reinforces the image of Mr. Donder as a true entrepreneur whom others copy. "Usta" (i.e., Master of a trade or craft) Oz whose machine shop we visited in Selcuk apparently copied machines produced by Mr. Donder in a second generation of production. This gives further evidence of diffusion (replication). A

further commentary is provided by examining a booklet describing the "Donder" cotton planting machine.

It might also be noted that the printing of many such booklets and pamphlets and catalogues by many different manufacturers represents a serendipitous spin-off of development and employment for the printing trade in the Izmir-Aydin Region.[1]

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[1]Ege Universitesi, Ziraat Fakultesi; Ziraat Alet ve Makinalari Fakultesi, "Donder" Pamuk Ekim Makinasi, Deney Raporu No. 204 (Bornova, Izmir, June 15, 1981), p. 32.

APPENDIX H

(compiled by John Kolars)

AGRICULTURAL CREDIT FOR TOPRAKSU LAND DEVELOPMENT WORK, DENIZLI PROVINCE, 1981

Type of Work	No. of Cases	Area (hectares)	Estimated Cost (in LT)	Estimated Credit (in LT)	Farmer Participation (in LT)
Gravity Flow Irrigation (ponds)	34	37,590	11,035,987	9,870,566	1,165,421
Surface-Water Irrigation Pumping	33	90,366	14,725,676	13,893,552	832,124
Underground-Water Irrigation Pumping	91	143,525	33,261,067	30,082,403	3,178,664
Drainage	8	33,145	3,319,755	1,831,769	1,487,986
Leveling	119	205,734	31,806,227	27,252,049	4,554,178
Field Row-Crop Ditching	22	64,040	11,922,200	9,884,817	2,037,383
Flood Prevention	18	22,666	8,861,742	6,861,452	2,000,290
Total	325	597,066[1]	114,932,654	99,676,608	15,256,046

[1]A field area may be counted more than once in this total.

Source: Director, TOPRAKSU, Denizli Province, September, 1982.

APPENDIX I

CROPPING IN AYDIN PROVINCE, TURKEY

	1965		1970		1975		1980	
	Area (hectares)	Yield (kilograms/ hectare)	Area (hectares)	Yield (kilograms/ hectare)	Area (hectares)	Yield (kilograms/ hectare)	Area (hectares)	Yield (kilograms/ hectare)
All Cereals	70,674	-	53,565	-	75,826	-	42,115	-
Wheat	24,173	1,185	17,285	2,095	41,640	2,047	17,800	2,923
Pulses	2,854	-	3,659	-	3,351	-	3,587	-
Tobacco	4,358	545	7,615	413	6,331	684	8,286	-
Cotton	70,040	-	76,190	-	58,545	-	64,250	-
Lint	-	656	-	859	-	1,046	-	858
Seed	-	1,064	-	1,374	-	1,673	-	1,373
Sunflowers	-	-	1	2,000	170	1,029	15,100	1,996
Sesame	2,042	825	2,407	764	3,482	758	1,877	811
Fodder Crops	NA	NA	410	-	909	-	1,058	-
Vegetables	5,732[1]	-	8,452	-	11,871	-	16,643	-
Fruit Trees (in million hectares not included below)	21.4	-	18.3	-	19.1	-	20.6	-
Citrus Trees	(276,000)		(408,782)		(598,383)		(705,333)	
Total Area Sown (excluding tree crops)	153,000+	-	147,483	-	151,336	-	137,967	-

[1] Provincial Yearbook, 1967.

Source: Compiled by John Kolars from the Turkish Censuses of Agricultural Structure and Production.

APPENDIX J

USERS GUIDE FOR THE SCRAPER-FLOAT

(translated by John Kolars)

Your scraper-float has been planned in a form to meet the needs of modern irrigation and farming. It is easy to test and to use under different field conditions. It has been built especially so that it can be connected to your hydraulic tractor.

In this user's guide you will find the information you want for long, adequate, and trouble-free performance from your new equipment. Examine this guide with attention; it will be useful to you. Keep this guide in a safe place in order to find it quickly and easily when future needs arise.

There are very few moving parts in your new scraper-float. If you use it and maintain it carefully, repair expenses will be very small. In case you need spare parts, their availability is assured by the manufacturer.

This tool has been prepared so that it can be cheaply repaired in your local repairshop.

(Marvin Parker, USAID, Lower Buyuk Menderes project leader. TOPRAKSU First Region Directorate, no date.)

APPENDIX K

FARM EQUIPMENT MANUFACTURING IN FIVE AEGEAN PROVINCES, 1968 AND 1979

Province	Number of Companies 1979	All Pieces of Equipment Manufactured			Land Levelers Produced	
		1968	1979	% Increase	1968	1979
Aydin	76	2,125	14,842	698	-	1,050
Izmir	33	3,264	19,000	582	-	295
Denizli	16	273	1,026	376	-	34
Manisa	48	1,977	8,408	475	-	51
Mugla	12	44	658	1,495	-	-
Total	185	7,683	43,934	572	-	1,430

Source: Mehmet Betil, et al., Tarim Alet ve Makinalari Arastirmasi, Turkiye Sinai Kalkinma Bankasi A.S., No. 33 (Istanbul: probably 1981); excerpted and translated by John F. Kolars.

APPENDIX L

LAND USE AND PROBLEM AREAS IN AYDIN PROVINCE

Land Use Distribution

Land Use	Hectares
Area Under Agriculture	334,706
Forest	243,714
Mountains and Stoney Lands	152,965
Pasture	53,698
Nonproductive	13,530
Lakes and Swamps	8,302
Total	806,915

Agricultural Land Distribution by Problem Type

Problem Type	Hectares
Salinized	54,974
Old Soils	74,921
Stoney	52,168
Eroded (water)	86,152
Total	268,215

Source: Provincial Office, Ministry of Agriculture, Aydin Province, 1981.

APPENDIX M

SOURCES OF SCRAPERS IN AYDIN PROVINCE

Name	Location
Ismail Donder	Soke
Ali Senirmak	Soke
Sebat	Soke
Adnan Gubukcu	Soke
Azim	Ortakler
Osman Yardim	Aydin

Source: Mehmet Betil, et al., Tarim Alet ve Makinalari Arastirmasi; Turkiye Sinai Kalkinma Bankasi A.S., No. 33 (Istanbul: probably 1981), excerpted and translated by John F. Kolars.

TOPRAKSU Scrapers

There are 30 mechanical scrapers at the Aydin TOPRAKSU engineering station which helped a total of 567 persons during 1978-1982. These scrapers work under the control of TOPRAKSU Technical Help, TOPRAKSU Credit Coop, and TOPRAKSU Technical Elements Information (Service).

The number of farmers helped in the last five years is as follows:

Date	No. of Farmers
1978	119
1979	96
1980	113
1981	125
1982 (as of September 24)	114
Total	567

Source: Provicial Office, Ministry of Agriculture, Aydin Province, 1981.

APPENDIX N

CROPS IN AYDIN PROVINCE, 1981

Crop	Area (in hectares)	Amount (in tons)	Seed (in tons)	Lint (in tons)
Cotton (with seed intact)	69,940	171,716	107,706	63,950
Corn	7,730	38,500	-	-
Tobacco (not irrigated)	6,888	4,653	-	-
Sesame	1,720	1,383	-	-
Wheat (high-yield variety)	20,730	55,665	-	-
Barley	13,775	30,312	-	-
Vegetables	13,759	NA	-	-
Tomatoes	4,075	118,100	-	-
Peppers	1,625	75,312	-	-
Eggplant	3,430	99,705	-	-

Source: Figures received from the files of the Technical Agricultural Directorate, Aydin Province, 1982.

APPENDIX O

NOTES ON THE AUTHORS

Thomas W. Casstevens is a Special Advisor to the Administrator of the Agency for International Development. He is on sabbatical leave from his position as Professor of Political Science at Oakland University in Rochester, Michigan. He has been Chairman of the Department of Political Science at Oakland University, Fulbright Visiting Professor at Jawaharlal Nehru University, Visiting Professor of Political Science at the University of Delhi, Visiting Scholar at the University of Kent at Canterbury, Visiting Fellow in Mathematics at Dartmouth College, and National Science Foundation Science Faculty Fellow. His publications include studies of government and politics in the United States, the United Kingdom, Canada, India, and the Soviet Union. His B.A. and Ph.D. in political science were awarded, respectively, by Reed College and Michigan State University.

John Kolars is a Professor of Geography and Near Eastern Studies at the University of Michigan. As a full-time faculty member he took special leave to work on this evaluation. He has worked in Turkey for the Food and Agriculture Organization of the United Nations and on research grants from the National Academy of Sciences/National Research Council, the Social Science Research Council, and the American Council of Learned Societies. He has also done research in Iran, Libya, Tanzania, and Sardinia. He has published on village agricultural development, the urbanizing of rural settlements, transportation development, and the potential impact of natural disaster on rural communities. His B.S. and M.A. were earned, respectively, in Geology and Geography at the University of Washington, Seattle, and his Ph.D. in Geography and Near Eastern Studies at the University of Chicago.

James D. Wilson, Jr. is a member of the Development Studies Program faculty with primary responsibility for management, rural development, and human resources development. He was a team member for the Impact Evaluation of the Northeast Agricultural Research Center in Thailand. He has been Acting Program Officer in Haiti with responsibilities for an integrated rural development project and private voluntary organization project coordination. Previously, he was Special Assistant for Administrative Services and Special Projects for the Metropolitan Transportation Commission in Berkeley, California and on an IPA assignment. He has been Yaounde Area Desk Officer, Program Analyst for Eastern and Southern Africa, and a Junior Officer Trainee assigned to Sierra Leone and then Zaire. He received a B.A. and M.A. from Howard University. Prior to joining AID in 1966, he participated in the Experiment in International Living (Norway) and Operation Crossroads Africa (the Ivory Coast).

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